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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,531	10/23/2003	Yasuhiro Izawa	116944	9115

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EXAMINER
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HANDAL, KAITI V

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 04/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/690,531

Applicant(s)

IZAWA ET AL.

Examiner

Kaity Handal

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 9-26 and 29-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 14-15, 20-21, 34-35, and 40-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 recites the limitation "the fuel cell" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 15 recites the limitation "the fuel cell" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 20 recites the limitation "the fuel cell" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 21 recites the limitation "the fuel cell" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 34 recites the limitation "the fuel cell" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 35 recites the limitation "the fuel cell" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 40 recites the limitation "the fuel cell" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 41 recites the limitation "the fuel cell" in line 3. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 11-12, 14-15, 22-24, 31-32, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1) and further in view of Shimazu et al. (US 2002/0031690 A1).

With respect to claims 1, 3-4, 22, and 24, Berlowitz teaches a fuel cell reformer system comprising: a pre-mixed fuel storing portion/emulsion container (fig. 2, 5) which includes a mixture state stabilizing means (agitator)/mixer (p2/paragraph [0018], lines 13-14 and paragraph [0017], lines 2-4), and an additive agent (emulsifier)/surfactant for making an even mixture of water and fuel to be supplied to a reformer (Illustrated) (p2, paragraph [0023]). Berlowitz further teaches a pre-mixed fuel supplying portion/outlet line (10). Though Berlowitz does not explicitly disclose a reformer containing a catalyst, such is inherent and necessary for a reformer to function.

Berlowitz fails to show wherein a an independent material supplying portion which supplies the reformer with independent material that contains water generated

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in a system including the fuel reforming apparatus, independently of the premixed fuel supplying portion. Shimazu teaches a fuel reforming apparatus (fig. 1) comprising a reformer (36), and a fuel cell (40) and an independent material supplying portion which supplies the reformer with independent material that contains water/steam (as illustrated in Fig. 2C) generated in a system including the fuel reforming apparatus, independently of the premixed fuel supplying portion in order to supplement water required for steam reforming (page 18, paragraph [0184], lines 8-14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include an independent material supplying portion which supplies the reformer with independent material that contains water/steam in Berlowitz's reformer, as taught by Shimazu, in order to supplement water required for steam reforming.

Limitations recited in claims 3 and 24 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

Regarding limitations recited in claims 2, 11-12, 23, and 31-32 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

With respect to claims 14 and 34, Berlowitz teaches a fuel cell system comprising a fuel reformer (fig. 2) and a fuel cell which generates electromotive force/provides start-up power to a vehicle (p1, paragraph [0007], lines 1-3).

With respect to claims 15 and 35, Berlowitz teaches a fuel cell system comprising a fuel cell system which generates an electromotive force/provides start-up power to a vehicle (p1, paragraph 0007], lines 1-3), and where the water supplied from the independent material supplying portion/line (9) contains water generated in the fuel cell (12) (p1, paragraph [0008], lines 21-31).

5. Claims 19 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1) in view of Shimazu et al. (US 2002/0031690 A1), as applied to claims 15 and 22 above, and further in view of Epp (US 6,063,515):

With respect to claims 19 and 39, Berlowitz as modified teaches all claim limitations as set forth above but fails to teach said system being comprised of a

hydrogen separating portion which includes a hydrogen permeable membrane that selectively makes hydrogen permeate there through and which separates hydrogen in gas emitted from the fuel reforming apparatus using the hydrogen permeable membrane; and a hydrogen supplying portion which supplies the fuel cell with the hydrogen separated in the hydrogen separating portion; and a second combustion portion which burns gas that remains after separation of hydrogen in the hydrogen separating portion, wherein the water supplied from the independent material supplying portion contains water generated in the second combustion portion.

Epp teaches a fuel cell system (fig. 1) comprising a vaporizer (102) a reformer (104) and a hydrogen separating portion (112) which includes a hydrogen permeable membrane that selectively makes hydrogen permeate there through and which separates hydrogen in gas emitted from the fuel reforming apparatus using the hydrogen permeable membrane (col. 7, lines 51-56); and a hydrogen supplying portion (113) which supplies the fuel cell with the hydrogen separated in the hydrogen separating portion (col. 7, lines 60-65); and a second combustion portion/catalytic burner (107) which burns gas that remains after separation of hydrogen in the hydrogen separating portion (112) (col. 7, lines 60-65 and col. 8, lines 4-6). It is known in the art that water is a by-product of burners and therefore it would be obvious to supply the water produced to the independent material supplying portion. Epp teaches a hydrogen separating portion (112) in order to separate the hydrogen component from remaining components in the reformat stream (111).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a hydrogen separating portion in Berlowitz' modified fuel cell reforming system, as taught by Epp, in order to separate the hydrogen component from remaining components in the reformat stream.

6. Claims 9 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1) in view of Shimazu et al. (US 2002/0031690 A1), as applied to claims 1 and 22 above, and further in view of Drnevich et al. (US 2003/0110693 A1).

With respect to claims 9 and 29, Berlowitz as modified fails to teach where an independent material-supplying portion includes a gas supplying portion supplies the reformer with gas containing oxygen, and a humidifying portion which adds the water generated in the system in a form of steam to the gas containing oxygen, that is to be supplied by the gas supplying portion to the reformer. Drnevich teaches a reforming reactor where a gas supplying portion supplies the reformer with gas containing oxygen, and a humidifying portion/(steam-oxygen mixture) and is to be supplied by the gas supplying portion to the reformer in order to convert residual methane to hydrogen and carbon monoxide (p1, paragraph [0011], lines 6-10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add humidifying portion/(steam-oxygen mixture) to the gas supplying portion to the modified reformer of Berlowitz, as taught by Drnevich, in order to convert residual methane to hydrogen and carbon monoxide.

7. Claims 5 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1) in view of Shimazu et al. (US 2002/0031690 A1), as applied to claims 1 and 22 above, and further in view of Epp et al. (US 6,063,515), and in view of Yamamuka et al. (US 6,273,957 B1).

With respect to claims 5 and 25, Berlowitz as modified discloses all claim limitations as set forth above but fails to show where fuel cell reforming system containing a premixed fuel supplying portion which includes a vaporizing portion communicating with the reformer, a heating portion which supplies the vaporizing portion with heat for enabling the premixed fuel to be vaporized, and a spraying portion which sprays the premixed fuel stored in the premixed fuel storing portion into the vaporizing portion.

Epp teaches a fuel cell reforming system containing a premixed fuel supplying portion includes a vaporizing portion (103) communicating with the reformer (104) in order to flash vaporize water and fuel (col. 7, lines 19-21), a heating portion (108a) which supplies the vaporizing portion (103) with heat in order to promote the vaporization process (col. 7, lines 37-42) thereby avoiding hot spots in reformer due to direct heating (col. 3, lines 9-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was to include a premixed fuel-supplying portion in Berlowitz' fuel cell reforming system, which includes a vaporizing portion communicating with the reformer, and a heating portion, as taught by Eppe, in order to flash and vaporize

water and fuel and promote the vaporization process thereby avoiding hot spots in reformer due to direct heating.

Berlowitz as modified fails to teach a spraying portion which sprays the premixed fuel stored in the premixed fuel storing portion into the vaporizing portion.

Yamamuka teaches a spraying portion/spreay nozzle (7) which sprays the premixed fuel/solutions (1 to 3) contained in the premixed fuel storing portion/source materials vessels into the heated vaporizing portion (8) in order to achieve carburetion of source materials (col. 5, lines 34-40).

It would have been obvious to one of ordinary skill in the art at the time the invention was to spray the premixed fuel/solutions contained in the premixed fuel storing portion/source materials vessels into the heated vaporizing portion of modified Berlowitz, as taught by Yamamuka, in order to achieve carburetion of source materials.

8. Claims 6, 13, 20-21, 26, 33 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1) in view of Shimazu et al. (US 2002/0031690 A1), Epp et al. (US 6,063,515) and in view of Yamamuka et al. (US 6,273,957 B1), as applied to claims 1, 5, 22 and 25 above, and further in view of Olsen, and in view of Inoue (US 2001/0049907 A1).

With respect to claims 6, 13, 26, and 33 Berlowitz as modified discloses all claim limitations as set forth above but fails to show wherein a heat exchanger which performs a heat exchanging between the gas containing hydrogen generated by the reforming reaction and the premixed fuel is disposed between the premixed fuel

storing portion and the vaporizing portion. Olsen teaches that recovering heat from exothermic processes can achieve great economies (Unit Processes and Principles of Chemical Engineering, Chapter I, page 4). It would have been obvious to have a heat exchanger which performs a heat exchanging between the gas containing hydrogen generated by the reforming reaction and the premixed fuel is disposed between the premixed fuel storing portion and the vaporizing portion in order to recover heat from the hydrogen generated by the reforming reaction and utilize it to heat the premixed fuel as evidenced by Olsen.

Limitations recited in claims 6, 13, 26, and 33 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

With respect to claims 20-21 and 40-41, modified Berlowitz teaches all claim limitations as set forth above including a fuel cell which generates an electromotive force/provides start-up power to a vehicle (p1, paragraph 0007], lines 1-3). Modified Berlowitz fails to teach said system being comprised of a hydrogen extracting portion which includes a hydrogen permeable membrane that selectively makes hydrogen permeate there through and which separates hydrogen in gas emitted from the fuel

reforming apparatus using the hydrogen permeable membrane; and the premixed fuel temperature increasing portion increases a temperature of the premixed fuel using the hydrogen extracted by the hydrogen extracting portion and supplies the hydrogen used for increasing the premixed fuel for the electrochemical reaction in the fuel cell.

Epp teaches a fuel cell system (fig. 1) comprising a vaporizer (103) a reformer (104) and a hydrogen separating portion (112) which includes a hydrogen permeable membrane that selectively makes hydrogen permeate there through and which separates hydrogen in gas emitted from the fuel reforming apparatus using the hydrogen permeable membrane (col. 7, lines 51-56); and a hydrogen supplying portion (113) which supplies the fuel cell with the hydrogen separated in the hydrogen separating portion (col. 7, lines 60-65). Epp teaches a hydrogen separating portion (112) in order to separate the hydrogen component from remaining components in the reformat stream (111).

It would have been obvious to one of ordinary skill in the art at the time the invention was to include a hydrogen separating portion in Berlowitz' modified fuel cell reforming system, as taught by Epp, in order to separate the hydrogen component from remaining components in the reformat stream.

Berlowitz as modified fails to show where the premixed fuel temperature increasing portion increases a temperature of the premixed fuel using the hydrogen extracted by the hydrogen extracting portion, and supplies the hydrogen used for increasing the premixed fuel for the electrochemical reaction in the fuel cell. Olsen

teaches that recovering heat from exothermic processes can achieve great economies (Unit Processes and Principles of Chemical Engineering, Chapter I, page 4). It would have been obvious to have a premixed fuel temperature increasing portion which increases a temperature of the premixed fuel using the hydrogen extracted by the hydrogen extracting portion, and supplies the hydrogen used for increasing the premixed fuel for the electrochemical reaction in the fuel cell in order to recover heat from the hydrogen extracted from the hydrogen extracting portion and utilize it to add heat to the premixed fuel temperature increasing portion as evidenced by Olsen.

Limitations recited in claims 20-21 and 40-41 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

9. Claims 16-18, and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berlowitz et al. (US 2003/0082419 A1) in view of Shimazu et al. (US 2002/0031690 A1), as applied to claims 15, and 22 above, and further in view of Wertheim (US 4,902,586).

With respect to claims 16-17 and 36-37, Berlowitz as modified discloses all claim limitations as set forth above but fails to show where the water supplied from the independent material supplying portion/line (9) contains water in exhaust gas emitted from an anode side of the fuel cell. Wertheim teaches a fuel cell reformer system where the water supplied from the independent material supplying portion contains water in exhaust gas emitted from an anode/cathode side (col. 2, lines 23-40) of the fuel cell in order to eliminate a water recovery in the fuel cell (col. 2, lines 11-12).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the independent material supplying portion/line with water present in exhaust gas emitted from an anode/cathode side of the fuel cell in Berlowitz's modified fuel cell reforming system, as taught by Wertheim, in order to eliminate a water recovery in the fuel cell.

With respect to claims 18 and 38, Berlowitz as modified discloses all claim limitations as set forth above but fails to show where the fuel cell system comprises a combustion portion which burns hydrogen that remains in exhaust gas emitted from an anode of the fuel cell and wherein the water supplied from the independent material supplying portion contains water generated in the first combustion portion. Wertheim teaches where the fuel cell system (fig. 1) comprises a combustion portion/burner (6) which burns hydrogen that remains in exhaust gas emitted from an anode (3) of the fuel cell and wherein the water supplied from the independent material supplying portion contains water generated in the first combustion portion

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(col. 2, lines 32-41) in order to remove hydrogen from the system and heat the gas stream (col. 2, lines 29-31) and in order to deem a water recovery system unnecessary (col. 2, lines 11-12).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a combustion portion in Berlowitz's modified fuel cell reforming system which burns hydrogen that remains in exhaust gas emitted from an anode of the fuel cell and wherein the water supplied from the independent material supplying portion contains water generated in the first combustion portion, as taught by Wertheim, in order to remove hydrogen from the system and heat the gas stream and deem a water recovery system unnecessary.

#### ***Allowable Subject Matter***

10. Claims 10 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the combination of a hydrogen permeable membrane in between a water passage and an oxygen passage which permeates steam into a reformer is not present in prior art.

#### ***Response to Arguments***

Specification

Objections made to the specification are withdrawn by examiner due to applicant's amendment.

Abstract

Objection made to the abstract is withdrawn by examiner. Upon further consideration the mentioned nozzle is part of the system as whole and does not need to be in the claims as applicant argued.

Prior Art Rejection

Applicant's arguments with respect to claim 1-41 have been considered but are moot in view of the new ground(s) of rejection and due to applicant's amendments to the claims.

However, upon further consideration, a new ground(s) of rejection is made in view of Berlowitz et al. (US 2003/0082419 A1) and further in view of Shimazu et al. (US 2002/0031690 A1). Shimazu teaches a reforming system having both a water supply which mixes with the fuel prior to reforming and a second independent water/steam supply fed to the reformer directly.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

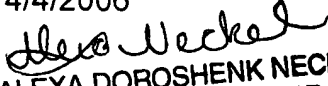
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
KH

4/4/2006  
  
ALEXA DOROSHENK NECKEL  
PRIMARY EXAMINER